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European Society of Anaesthesiology

ESA

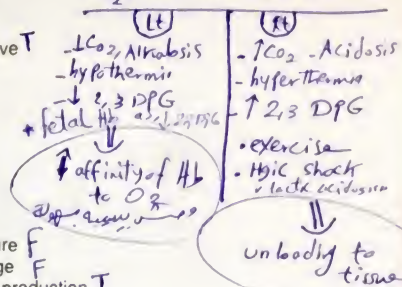
* In high altitude (moderate)
→ Shift of Curve to Right due to Influence of 2,3 DPG
→ In extreme altitude → shift to Left
or ↓ CO₂ (respiratory alkalosis).

Sample questions ITA/Part I Paper A

Inadequate tissue oxygenation may occur, in spite of a normal PaO₂, in the presence of

- A. anaemia T
- B. a shift to the left of the oxyhemoglobin dissociation curve T
- C. low cardiac output T
- D. local vasoconstriction T
- E. metabolic alkalosis T

O₂/Hb dissociation curve



2. Which of the following statements are true?

- A. the carotid bodies are sensitive to arterial blood pressure F
- B. hypotension produces increased baroreceptor discharge F
- C. increased plasma renin activity stimulates aldosterone production T
- D. posture influences aldosterone production T
- E. antidiuretic hormone secretion is increased in systemic hypotension T

Sensitive to stretch

3. The elastic tissue within the arterial system

- A. allows transitory storage of the major part of the stroke volume during the ejection phase F
- B. contributes to the onward flow of blood during ventricular diastole T
- C. minimises the effects of intrathoracic pressure upon aortic pressure F
- D. contributes to conversion from intermittent to continuous blood flow T
- E. maintains coronary perfusion T

4. During sustained severe exercise the

- A. oxygen saturation of mixed venous blood remains above 70 per cent F
- B. minute volume of ventilation may reach 130 litres T
- C. pulmonary vascular resistance falls T
- D. cardiac output may reach 50 litres/min T
- E. core temperature may reach 40°C T

↑ mixed venous O₂ delivery

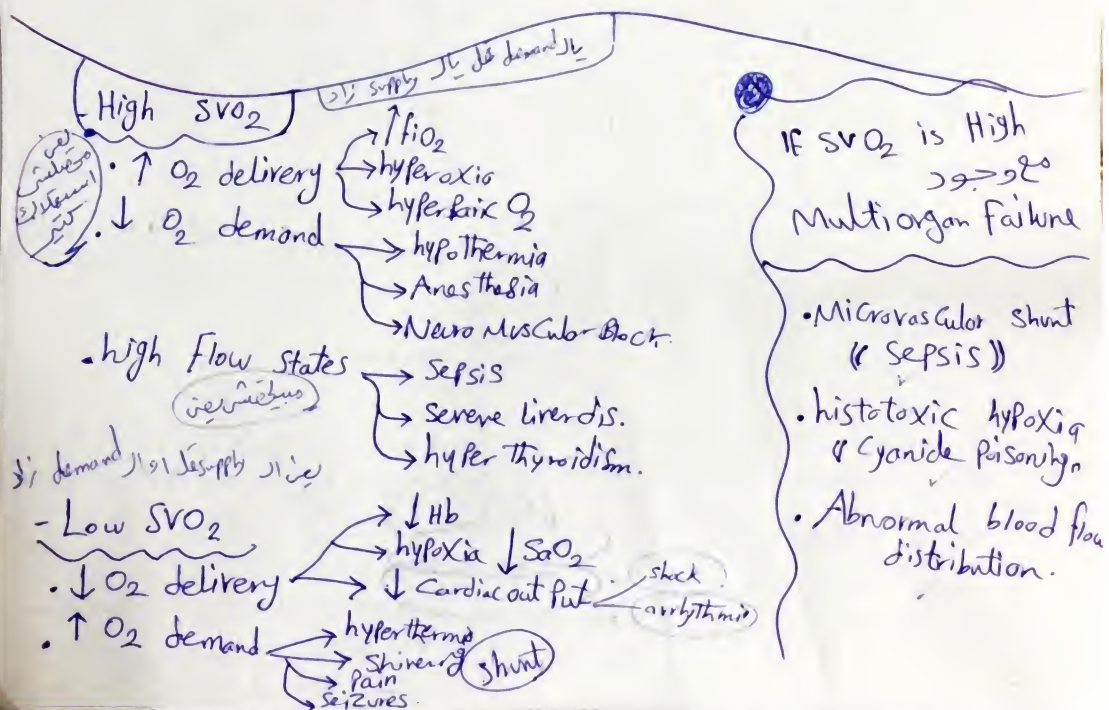
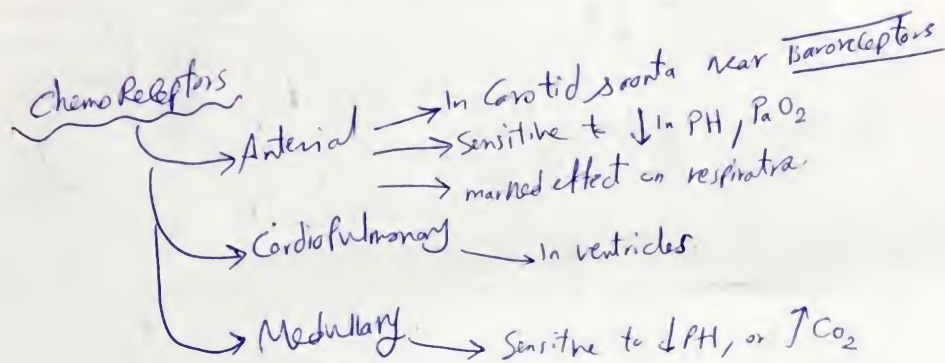
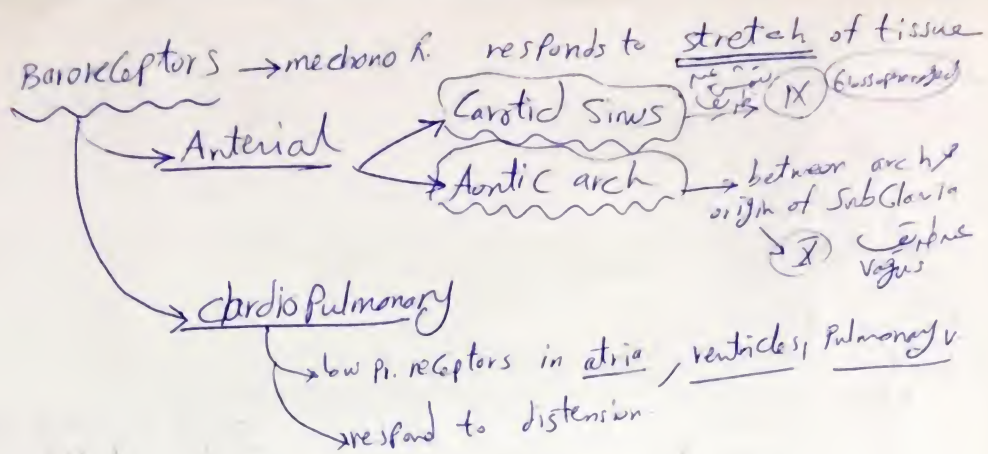
25-40 L
• 20 L → active pt
• 35 L → athletes

SVO₂ → mixed venous saturation
tissue O₂ delivery

normally 65-75% → also O₂ extraction 25-35%
Normal PvO₂ → 35-45 mmHg

• via sample blood from PAC
• measure end result of O₂ consumption & delivery
If low → ↑ consumption → ↑ demand

ScVO₂
→ Central venous O₂ saturation



Pressure ↑ Δ LV Δ Contractility ↑ Δ LV Δ

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Rate of Pressure rise in ventricles
ventricular Contractility assessment

5. Ventricular dP/dt is increased by an increase in

- A. after-load
- B. pre-load
- C. myocardial contractility
- D. ionized calcium concentration
- E. heart rate

T

6. In the normal pulmonary vascular bed

- A. the mean arterial pressure is half the mean aortic pressure F
- B. the vascular resistance is lower than the systemic vascular resistance T
- C. 50% of the total blood volume is present at rest F
- D. the wedge pressure equals the capillary pressure F
- E. hypoxia causes dilation of vessels F

HIV

Hypoxia → dilatation in Systemic
Constriction in Pulmonary

7. Intra-pleural pressure is

- A. subatmospheric T -ve Pressure
- B. related to mid-oesophageal pressure T
- C. changing throughout the ventilatory cycle T
- D. equal throughout the pleural space F
- E. increased by coughing T

8. Closing capacity

Volume of lung at which its smallest airway, resp. bronchioles collapse

- A. normally exceeds residual volume T
- B. decreases in the supine position F
- C. is the sum of closing volume and residual volume T
- D. decreases with age F as age ↑
- E. is normally less than functional residual capacity T

Closing Capacity = closing volume + Residual volume

9. Intrapulmonary shunts increase

- A. mixed venous oxygen tension F
- B. arterial oxygen saturation F
- C. when pulmonary blood flow is partially obstructed F
- D. in the presence of atelectasis T
- E. with severe fluid overload T

alveoli is not inflated so perfusion is shunted
enough air within lung volume to keep air way open during T ↓
No ventilation

shunt → Perfusion of non-ventilated area

dead space → ventilation of non-perfused area

shunt → Pathological

Blood in area of shunt receive NO Oxygen
so, arterial hypoxemia which minimally responsive to O₂ supplement

- occur when alveoli filled with fluid
- so, main cause of hypoxia during P. edema, pneumonia

PAQ_2 me ~~dot~~ PAQ_2 CW
 PAQ_2 Coronary bl. V.
 drain directly to Lt ventricle.

Shunt is \downarrow by Pulmonary vaso constriction
 hypoxia.

$$FRC = ERV + RV$$

Closing Capacity

Small airway \rightarrow collapse
 Branchioles
 don't collapse.

Partial Pn of O₂ at which 50% of Hb Saturated
(26.6 mm Hg / 3.5 kPa)

10. The symbol P50 refers to the

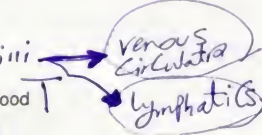
- (3.5 kPa) (27.6 mmHg)
- A. partial pressure of oxygen at 50 mmHg (6.7 kPa) F
 - B. PaO₂ at which the oxygen content is 50 ml/100 ml blood F
 - C. percentage saturation of hemoglobin at a PaO₂ of 50 mmHg (6.7 kPa) F
 - D. oxygen content of plasma at a PaO₂ of 50 mmHg (6.7 kPa) F
 - E. PO₂ at which the hemoglobin is 50% saturated T

11. Pituitary feedback mechanism regulates secretion of

- A. ACTH T
- B. adrenaline F
- C. cortisol T
- D. insulin F
- E. thyroxine T

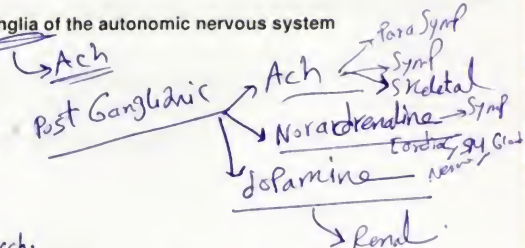
12. Cerebrospinal fluid

- 4 hrs F (25 mL/hr)
- A. production in an adult is 150 ml/24 h F
 - B. is mainly reabsorbed in the lateral ventricles F
 - C. does not accurately reflect acute changes in base excess in arterial blood T
 - D. is virtually free of glucose F
 - E. specific gravity (relative density) is 1015-1020 F (1004 - 1006 / 1006 - 1008)



13. The transmitter substances in all the ganglia of the autonomic nervous system include

- A. acetylcholine T
- B. noradrenaline F
- C. 5-hydroxytryptamine F
- D. butyrylcholine F
- E. dopamine F



14.

Inulin naturally occurring poly sacch.

- A. is totally removed from blood passing through the kidney F
- B. is not reabsorbed by the renal tubules T
- C. is secreted by renal tubular cells F
- D. is metabolised by renal tubular cells F
- E. has a concentration in glomerular filtrate which is the same as that in plasma T

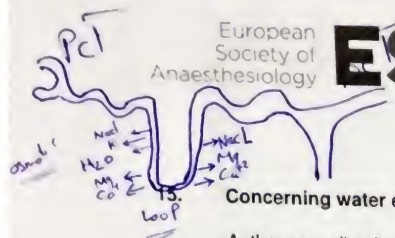
Medically

help to measure kidney function by GFR
 - not secreted/absorbed in any appreciable amount at nephron.

Volume of fluid Filtered from renal Glomerular Capillaries into Bowman's Capsule.
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* human urine osmolality (during night)
water intake same

$\sim 1200 \text{ mOsm/Kg H}_2\text{O}$
4 times plasma



Concerning water excretion

• descending loop

- reabsorption to water

- A. the ascending limb of the Loop of Henle is impermeable to water **T**
 B. chloride reabsorption from the Loop of Henle occurs passively **F**
 C. under conditions of maximum antidiuresis, 5% of water reabsorption occurs in the distal tubule **F**
 D. the maximum medullary osmolality is 800 mosmols/LF **1200**
 E. dehydration induces aldosterone production **T**

16. The anion gap

$$= (\text{Na} + \text{X}) - (\text{Cl} + \text{HCO}_3) \cdot \approx 6-12$$

- A. is normally 12mmol/L **T**
 B. increases in lactic acidosis **T**
 C. is decreased in aspirin poisoning **F**
 D. decreases in diabetic ketoacidosis **F**
 E. is increased in renal failure **T**

High anion gap { \rightarrow exogenous
• salicylate, methanol, ethanol
 \rightarrow endogenous
(non volatile acids)

↓ excreted → renal failure

- ↑ Production
 - ↳ Ketoacidosis
 - ↳ Lactic acidosis
- C anaplerotic Inhibitory ↓ alcohol

Concerning carbonic acid and bicarbonate in the blood

→ must be maintained

- A. at pH 7.4, the ratio of bicarbonate to carbonic acid is 20 to 1
- * B. the buffer system depends upon carbonic anhydrase
- C. the hydrogen ion formed by carbonic acid is buffered by reduced haemoglobin
- D. the Henderson-Hasselbalch equation describes the buffer equilibrium
- E. extracellular buffering of excess hydrogen ions occurs instantaneously

- ## 18. Cytochrome P450

Enzyme has important role in metabolism, also metabolize toxic comp like drugs, bilirubin.

- A. is an enzyme which regulates the speed of oxygen release from haemoglobin
B. is present in sympathetic nerve endings *Liver, small intestine*
C. participates in the metabolism of noradrenaline
D. is a terminal oxidase important in biotransformation of drugs
E. is a potent enzyme inducer

- In the movement of fluids and dissolved molecules**

- A. diffusion is proportional to the permeability of the membrane T
- B. a non-diffusible anion will slow transfer of a diffusible cation T
- C. the trans-membrane potential depends upon the presence of non-diffusible ions T
- D. the osmotic pressure is necessary to prevent ionic migration F
- E. filtration is hydrostatic pressure dependent T

20. The stomach

- A. is responsible for the absorption of approximately 25% of the ingested protein **F**
- B. secretes vitamin B12 **F**
- C. acidity depends upon the activity of carbonic anhydrase in its parietal cells **T**
- D. decreases its motility when fat enters the intestine **T**
- E. is capable of large changes in capacity with small changes in pressure **T**

21. Labetalol

during exercise
- maintain
e volume

- A. can cause postural hypotension **T**
- B. reduces heart rate **T**
- C. has an elimination half-life of 24 hours **F** (6-8 hr oral) (5.5 hr IV)
- D. is a more potent alpha than beta adrenoreceptor blocker **F** more selective α than β
- E. may cause bronchoconstriction (dyspnea) **T**

equivalent in both
B-blocker is some α
orally α to B 1.3
specific α non-specific

22. Beta adrenoreceptor stimulant drugs can cause

- A. hyperglycaemia **T**
- B. hypokalaemia **T**
- C. increased gastrointestinal motility **F**
- D. skeletal muscle tremor **T**
- E. increased contractility of the pregnant uterus **F**

Smooth m. Relaxant \rightarrow lung
B2 \rightarrow B2 vessels \rightarrow uterus
Stomach \rightarrow lipid metabolism

B1 \rightarrow +ve inotropic, chronotropic (↑HR, E.C.P)
Secretion from stomach (Chief)
Renin Release from Kidney

23. Reliable early signs of cyanide toxicity due to sodium nitroprusside infusion include

Nitroprusside
Nitric acid
Cyanide
early \rightarrow vit B12 administration

- A. progressive metabolic acidosis **T**
- B. abnormal electroencephalographic changes **F**
- C. increased mixed venous oxygen tension **T**
- D. constant response to low dose infusion of sodium nitroprusside **F**
- E. a decrease in haemoglobin saturation **F**

early metabolic acidosis
high anion gap
high mixed venous O₂ tension

Sym: headache, vertigo, confusion
Drosha, loss consciousness
Cpts arrest

24. Effects of atropine instillation in the normal eye include

- A. paralysis of the sphincter pupillae muscle **T**
- B. paralysis of the ciliary muscle **T**
- C. increase in intra-ocular pressure **F**
- D. enophthalmos **F**
- E. photophobia **T**

Atropine eye \rightarrow pupil dilatation
Cycloplegic (Paralysis of accommodation)
relax cholinergically innervated
sphincter M. of iris, Ciliary muscle.

25. Intracranial blood volume is increased by

- A. halothane **T**
- B. vecuronium **F**
- C. thiopentone **F**
- D. nitroglycerine **T**
- E. ketamine **T**

26. Tinnitus may be caused by

- A. codeine **F**
 - B. aspirin **T** *high doses*
 - C. cocaine **F**
 - D. lidocaine (lignocaine) **T**
 - E. gentamycin **F** *as*
- Polymyxin B, erythromycin, Vancomycin, Neomycin.*

27. Cerebral oxygen consumption is significantly decreased by

- A. propofol **T**
 - B. thiopentone **T**
 - C. nimodipine **F**
 - D. nitrous oxide **F**
 - E. fentanyl **F**
- Ca²⁺ blocker for cerebral vasospasm*
B. supply

28. Uptake of an inhalational anaesthetic from the alveoli to the blood is influenced by the

- A. blood/gas partition coefficient of the agent
- B. alveolar ventilation
- C. cardiac output
- D. ventilation/perfusion ratio in the lung
- E. partial pressure gradient across the alveolar capillary membrane

29. Prolonged exposure to nitrous oxide

- A. inactivates vitamin B12 *via*
 - B. interferes with methionine metabolism *Inhibition*
 - C. interferes with folate metabolism *Inhibition*
 - D. impairs deoxyribonucleic acid (DNA) synthesis
 - E. produces megaloblastic haemopoiesis
- IF > 8 hrs*

30. Inhalational anaesthetic agents with a blood/gas partition coefficient of less than 2.6 include

- A. sevoflurane 0.65
- B. isoflurane 1.4
- C. desflurane 0.42
- D. halothane 2.4
- E. diethyl ether F

→ describe solubility of Inhaled GA in blood.
 → the more soluble → the more higher blood-gas Partition Coefficient
 → Induction rate & recovery

31. Anaphylaxis to intravenous anaesthetics

- A. is prevented by antihistamine premedication F
- B. is characterised by profound hypotension T
- C. only occurs with prior exposure F
- D. is associated with elevated serum tryptase concentrations T
- E. is dose related F

32. Ketamine

- A. sensitises the myocardium to adrenaline T
- B. is a butyrophenone derivative F
- C. is poorly soluble in water T
- D. causes bronchoconstriction F
- E. has a marked chronotropic effect T

Phencyclidine derivatives.
 Soluble in water pKa 7.5

33. Concerning propofol

- A. it has a high clearance rate in excess of liver blood flow T
- B. extra-hepatic metabolism occurs to a significant extent T
- C. significant reduction in the volume of distribution occurs in elderly patients F
- D. it may induce burst suppression of EEG activity T
- E. clearance is 870-2140 ml/min T

High clearance chch
 → Rapid redistribution
 → Hepatic & Extrahepatic metabolism
 → Renal & Extra renal clearance
 → No active metabolites

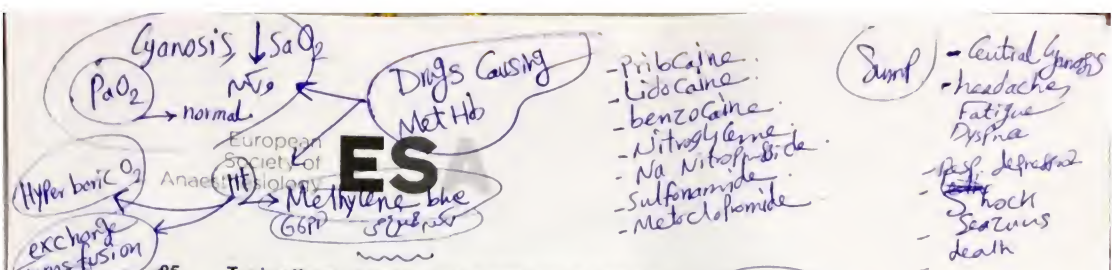
34. Local anaesthetic agents primarily biotransformed in the liver include

- A. ropivacaine T
- B. prilocaine T
- C. lignocaine (lidocaine) T
- D. procaine F
- E. bupivacaine T

Less Cardiac

esters by cholinesterase

Amide
 metabolised in liver by Cytochrome P450
 metabolised in liver by Plasma Cholinesterase
 Ester
 metabolised in liver by Plasma Cholinesterase
 Bupivacaine
 etidocaine
 lidocaine
 mepivacaine
 ropivacaine
 prilocaine



85. Toxic effects of amide local anaesthetics include

- A. myocardial depression T
- B. methaemoglobinemia T
- C. central nervous system depression T
- D. bronchospasm F
- E. convulsions T

Prilocaine in EMLA Cream

Methaemoglobinemia
Altered state of Hb in which
 Fe^{+2} oxidised \rightarrow Fe^{+3} (ferric)
ferrous
unable to bind to O_2

36. Concerning pharmacokinetics:

- A. only non-ionised drugs will readily distribute into the lipid phase of membranes T
- B. propofol has a high clearance T
- C. for a given clearance, the elimination half life of a drug is directly proportional to the volume of distribution T
- D. drugs with a low extraction ratio are affected by hepatic blood flow F
- E. the clearance of lidocaine (lignocaine) approaches hepatic blood flow T

shift
 O_2 Hb DC
to left
as difficult
to release
 O_2

37. Recognised factors in the inactivation of mivacurium include

- A. glomerular filtration F
- B. protein binding F
- C. hepatic biotransformation T
- D. hydrolysis by plasma cholinesterase T
- E. blood pH F

by plasma cholinesterase

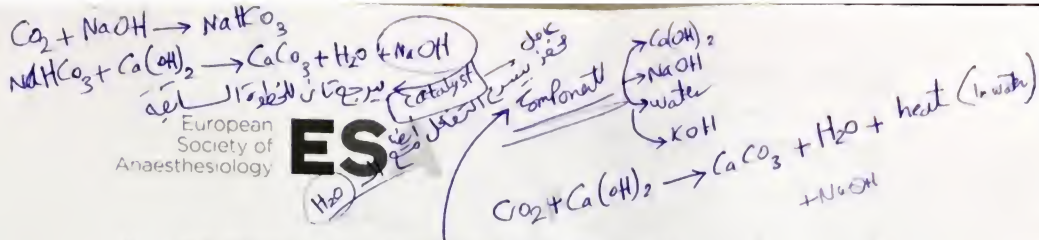
esters local anaesthetics
Procaine
tetracaine
chlorprocaine

38. Morphine may provoke

- A. nausea and vomiting T
- B. bronchoconstriction T
- C. increased output of urine F
- D. constipation T
- E. constriction of the pupils T

39. Platelet aggregation is reduced by

- A. acetylsalicylic acid T
- B. dipyridamole T
- C. tranexamic acid F
- D. ketorolac T
- E. dextran T



45. The reaction of carbon dioxide with soda lime includes the

- A. formation of sodium carbonate T
- B. formation of calcium carbonate T
- C. release of heat T
- D. release of water T
- E. production of carbon monoxide F

46. Poiseuille's law states that flow rate is proportional to the

- A. square of the radius of the tube F
- B. length of the tube inversely
- C. density of the fluid
- D. viscosity of the fluid
- E. pressure gradient T

$Q = \frac{\pi R^4 \Delta P}{8 \eta L}$
 volume flow rate of fluid
 R radius of pipe
 ΔP pressure gradient $P_1 - P_2$
 η viscosity
 L length

47. Concerning the pneumotachograph:

- A. it measures pressure change across a resistance T
- B. its accuracy does not require laminar gas flow F
- C. it is not suitable for accurate breath-by-breath measurement F
- D. its accuracy is affected by temperature change T
- E. changes in gas composition require recalibration T

→ measure flow according to venturi effect
 when flowing fluid via narrow section → pressure ↓
 → velocity ↑

48. Recognised methods of effectively reducing operating room concentrations of waste volatile anaesthetic gases include

- A. the use of a condenser humidifier F
- B. the use of low flow anaesthesia T
- C. piping waste gases to floor level F
- D. passing waste gases through activated charcoal T
- E. passive ducting to the external atmosphere F

49. Concerning heat loss during anaesthesia:

- A. conduction is the most important phenomenon F
- B. convection is decreased when the air adjacent to the body is warm T
- C. radiation is decreased by aluminium foil blankets T
- D. respiration equals 30% of the total heat loss F
- E. sweating is decreased when the relative humidity increases T

✓ Radiation 50%
 ✓ Convection 30%
 ✓ Evaporation ~20%
 ✓ Conduction
 ✓ Respiration 10%
 ✓ Anaesthesia 1

Hypothermia effect

arrhythmia
 ↓ CO₂
 ↓ O₂ delivery

- ↑ O₂ consumption during mild hypothermia (34°C)
 also, during rewarming → shivering by 500%

- ↑ Bl. viscosity
 - mild acidosis

- potentiate action of M.R.
 - ↓ metabolic rate

Hagen Poiseuille formula For laminar flow through tubes.

$$Q = \frac{\Delta P \pi R^4}{8 \eta L}$$

Q → Flow
 ΔP → Pressure difference
 π → constant
 R^4 → radius
 η → viscosity
 L → length

Clinical Application

- Transfusion set → Double needle diameter
 pressure → viscosity

- 1st of hypovolemic shock → Tissue Perfusion ↑ by
 ↑ blood volume
 ↓ Lower peripheral resistance

- In Controlled hypotension
 $P = Q \times R$
 MAP ← CO → systemic vascular resistance
 so, if hypotension → ↓ Q or ↓ R

- In Anesth. breathing System For laminar flow use

• Smooth internal surface tube

- Short as possible
- No constrictions
- of large diameter
- Gradual bending

- Silver tube (Regnault's) Hygrometer.
- wet & dry bulb hygrometer.
- Hair hygrometer.
- Electronic hygrometer.
- Mass Spectrometer → measure water vapor concentration in only gas mixture

50. The humidity of the atmosphere is measured by

- A. determining the dew point
- B. a wet and dry bulb thermometer
- C. cooling a known volume of air
- D. absorption of water by a hair
- E. measuring barometric pressure

Temp. at which RH > 100%, & water vapor condense to form vapor.

51. Techniques for measuring blood flow include

- A. ultrasound
- B. dye dilution
- C. plethysmography
- D. thermal dilution
- E. electromagnetism

52. Pressure in the superior vena cava is influenced by the

- A. right ventricular performance
- B. position of the patient
- C. intra-abdominal pressure
- D. mean airway pressure
- E. competence of the tricuspid valve

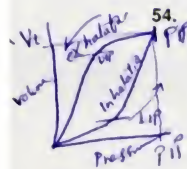
53. volume of air exhaled which doesn't stay in gas exchange
→ Anatomical dead space
not perfused area

It is necessary to know the arterial PCO_2 in order to measure

- A. carbon dioxide output
- B. physiological dead space
- C. minute volume of ventilation
- D. residual lung volume
- E. functional residual capacity

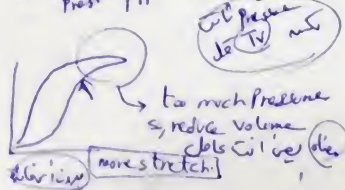
$$V_d = \frac{P_a CO_2 - P_e CO_2}{P_a CO_2} V_t$$

dead space
tidal volume
Partial P. of exhaled CO_2
Partial Pressure of CO_2 in artery

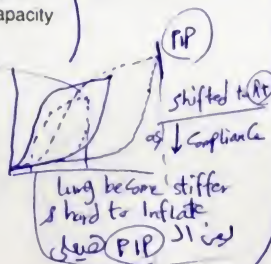


A pressure volume loop can measure

- A. lung compliance
- B. airway resistance
- C. intra-pleural pressure
- D. functional residual capacity
- E. closing volume



Shallow breath
dead space
more stretch



For Alveolar CO_2

For Anatomical

$$P_a CO_2 - P_{mixed} \text{ expired } CO_2$$

nitrogen dilution

* ventilated
Rate 10 x T_v 500
Rate 20 x T_v 250
Page 11 of 26
MV 5L
10 x 500
better than shallow breath quickly

* Taking deep breath more slowly better than shallow breath quickly

55. Measurement of the relationship between intracranial pressure and volume assesses

- A. the integrity of the blood-brain barrier
- B. cerebral compliance
- C. cerebral blood flow
- D. cerebral metabolic rate
- E. cerebral vascular diameter

Volume & Pressure
Compliance

56. In a supine young adult with a residual volume of 1200 ml

- A. closing volume will decrease with increasing age
- B. closing volume will be approximately 1000 ml
- C. closing capacity will be decreased by general anesthesia
- D. closing capacity is approximately 1700 ml
- E. total lung capacity is about 5000 ml

↑ age
FRC
GA ↓

57. Concerning manometers:

$1 \text{ mmHg} = 1.36 \text{ cm H}_2\text{O} = 1 \text{ torr}$
 $1 \text{ atm} = 1 \text{ bar} = 101 \text{ kPa} = 760 \text{ mmHg} = 1030 \text{ cm H}_2\text{O} = 15 \text{ psi}$

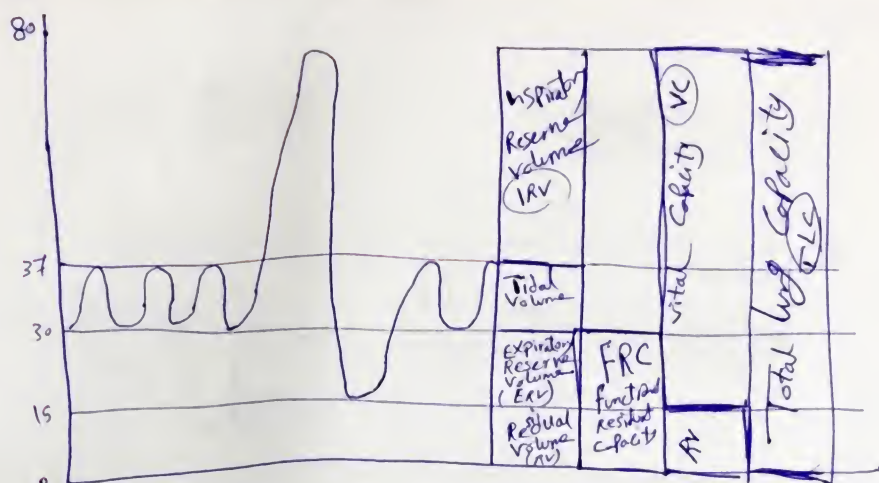
- A. pressure which supports a 10mm column of mercury will support a 13.6cm column of water
- B. 1 kPa is equal to a pressure of 7.5mm Hg
- C. the two limbs of a fluid manometer must be of equal diameter
- D. a mercury barometer used to measure atmospheric pressure is sealed with a vacuum above the surface of the liquid
- E. aneroid gauges do not contain liquid

↳ Bourdon gauge
↳ High Concentration

58. Concerning the measurement of body fluid spaces:

- A. indocyanine green is excreted unchanged in the urine
- B. extracellular fluid volume is measured using deuterium
- C. intracellular fluid volume is measured indirectly from extracellular volume and total body water
- D. plasma volume is measured with iodine labelled serum albumin
- E. chromium labelled red cells are used to measure blood volume

~~Dalton's Law~~
Concentration of volatile
= Vapor Pressure / Atmospheric P.



$$FRC = ERV + RV$$

2400 mL in 80 kg

Spirometry - low cost, few v's

RV - air in v

↓
Nitrogen wash out, helium dilution
body plethysmography.

Closing Capacity

$$= RV + \text{closing volume}$$

Young → closing Capacity 10% of VC

erect P. → closing = FRC = 40% of VC
in 60 yrs.

Supine → closing = FRC at 44 yrs

Neonate → lung elastic recoil is ↓
• More airway closure
• closing C > FRC
• ↓ PaO₂

Closing Volume

Volume of lung inflated when small airway in dependent parts of lung start to collapse during expiration

Normally closing Volume < FRC.
to account for RV of lung at end of expiration

If closing volume encroach on FRC

airway closure may occur during normal expiration & ↓ ventilation

FRC remain > closing V.

closing Volume ↑ as age.

In Supine closing V > FRC by mid 40s.

& In erect position by 60 yrs.

↓ FRC during GA ↓ below closing vol
so, may ↑ V/Q mismatch.

59. The following can be used in the statistical analysis of the results of a clinical investigation

- A. unpaired t-test
- B. χ^2 (chi-squared) test
- C. analysis of variance
- D. sequential analysis
- E. paired t-test

60. Concerning the following statements:

- A. the null hypothesis states that the two treatments are equally effective T
- B. the significance level is a probability value that ensures that the outcome is clinically significant F
- C. the standard deviation is a measure of the central value of the sample F
- D. the standard error is used for the estimation of confidence intervals T
- E. blood pressure is measured on an ordinal scale F

$$1 \text{ atm} = 1 \text{ bar} = 760 \text{ mmHg} = 1030 \text{ cm H}_2\text{O} = 15 \text{ PSI}$$

Sample questions ITA/Part I
Paper B

Mechanical hyperventilation in a normal patient during the entire course of anaesthesia is associated with

- A. markedly diminished requirements for post-operative analgesia F
- B. a shift to the right of the oxyhaemoglobin dissociation curve F
- C. a decrease in PaO_2 F
- D. postoperative hypoventilation T
- E. cutaneous vasodilatation F

Hypoxia → VC

2. Predictors of cardiac morbidity and mortality include

- A. aortic stenosis T
- B. myocardial infarction occurring 2 months previously T
- C. a prolonged QT (frequency corrected) interval T
- * D. occasional ventricular extra-systoles F
- E. intra-operative nodal rhythm T

3. Patients with untreated hypothyroidism show

- A. resistance to hypnotics F
- B. depression of cardiac performance T
- C. high voltage T waves on the ECG F
- D. increased sensitivity to non-depolarising neuromuscular blocking drugs T
- E. delayed return of consciousness after anaesthesia T

unstable & liable CVS:
→ Extreme Sensitivity to drugs that affect CNS.
→ ↑ Probability of Severe resp. def.
→ Myxedema coma PR by:
- hypothermia
- trauma
- infection
- Resp. Dependent

4. Concerning therapy with anticholinergic drugs:

→ hyoscine is the shortest

- A. the action of glycopyrrolate is longer than atropine T
- B. atropine increases dead space T
- C. atropine premedication should be avoided in febrile children T
- D. 1.0 mg atropine produces complete vagal blockade in a 70 kg man F
- E. hyoscine (scopolamine) premedication should be avoided in elderly patients T

- Pt. should be euthyroid
- If Elective, mild dis.

→ Procede & Caution
→ rely on Regional
→ Temp. Control
→ Steroid Screen

* Atropine & hyoscine → Tertiary → cross BBB Patients

* Glycopyrrolate → Quaternary → doesn't cross

as, adrenal insuff? due to impairment of hypothalamo-pituitary-adrenal axis
↓ response to stress

ER → Procede & Caution
T₃, T₄
Slowly

5. Intense peripheral vasoconstriction can be reversed with

- A. phentolamine T
- B. sodium nitroprusside T
- C. esmolol F
- D. nifedipine T
- E. high spinal anaesthesia T

CCB

Sympathectomy

6. Drugs known to increase barrier pressure at the gastro-oesophageal junction include

- A. droperidol F
- B. atropine F
- C. metoclopramide T
- D. fentanyl F
- E. neostigmine T

Dopamine antiemetic
Antipsychotic

7. Recognised treatment of a post-operative thyrotoxic crisis includes

- A. sedation T
- B. plasmapheresis T
- C. corticosteroids T
- D. propranolol T
- E. calcitonin F

If hypocalcemic

8. Recognised complications of abdomino-perineal resection of the rectum include

- A. deep venous thrombosis T
- B. paralytic ileus T
- C. air embolism F
- D. postoperative atelectasis T
- E. uraemia F

Factors associated with the development of postoperative atelectasis include

- A. abdominal pain F
- B. COPD T
- C. ankylosing spondylitis T
- D. thoracic surgery T
- E. spinal anaesthesia F

14. Problems with routine preoperative chest X-rays include

- A. a high percentage of false positive T
- B. a high percentage of false negative T
- C. a considerable risk of radiation induced cancer f
- D. very few unsuspected positive findings T
- E. a high percentage of clinically insignificant, positive findings T

15. Venous air embolism is associated with

- A. arterial hypotension T
- B. a decrease in end-tidal carbon dioxide concentration T
- C. cardiac arrhythmias T
- D. a decrease in pulmonary vascular resistance f
- E. a decrease in intracranial pressure F

$\rightarrow \uparrow \text{CO}_2 \rightarrow \text{VD} \rightarrow \uparrow \text{ICP}$

• air entering \rightarrow Rt heart \rightarrow pulmonary circulation

• \uparrow PVR \downarrow left atrial filling \rightarrow \downarrow CO

• LV filling \downarrow \rightarrow \downarrow CO

• \downarrow In EtCO_2 / \uparrow PaCO_2
• \uparrow CVP

16. Postoperative cerebral vasospasm in a patient with a subarachnoid haemorrhage

- A. does not occur provided that the aneurysm has been clipped successfully F
- B. may be treated with calcium antagonists T
- C. usually occurs two weeks after operation F
- D. is prevented by postoperative ventilation F
- E. may produce a hemiplegia T

4th day \rightarrow 10th day

17. In the diagnosis of brain-stem death

- A. clinical criteria are invalid in a hypothermic patient T
- B. caloric testing is used to test the integrity of the Vth cranial nerve f
- C. an isoelectric EEG is pathognomonic f
- D. absence of neuromuscular blockade should be confirmed with a peripheral nerve stimulator T
- E. reflex movements of the legs may still occur T

vestibulo-ocular reflex
oculomotor VII
abducent VI

18. Methods of reducing intracranial pressure include

- A. mannitol T
- B. sodium nitroprusside F
- C. ventricular drainage T
- D. isoflurane f
- E. nimodipine f

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$\downarrow \text{I} \text{ EtCO}_2 \rightarrow \text{VQ} \rightarrow \uparrow \text{ICP}$

• Air enters vein \rightarrow Rt heart \rightarrow Pulmonary circulation

• \uparrow RVB, \downarrow left atrial filling
• LV filling $\downarrow \rightarrow \downarrow \text{COP}$

• \downarrow I EtCO₂ / \uparrow PaCO₂
• \uparrow CVP

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III
oculomotor
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Subdural → From veins
 Extradural → From arteries

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For bridging veins - which cross subdura

19. Acute subdural haematoma

- A. results from haemorrhage from the middle meningeal artery F
- B. is frequently bilateral f
- C. is often associated with secondary bleeding following decompression T
- D. is a complication of chronic alcoholism T
- E. carries a good prognosis when associated with a basal skull fracture F

20. The following are associated with increased intracranial pressure following head trauma:

- A. papilloedema T
- B. pulmonary oedema T
- C. hypertension T
- D. a Glasgow coma score greater than 12 f
- E. bradycardia T

21. A left sided double lumen endobronchial tube

- A. can be used for left lower lobectomy T
- B. is suitable for a right sided broncho-pleural fistula T
- C. has a dedicated orifice for the left upper lobe bronchus f
- D. is used in preference to a right sided tube wherever possible T
- E. is contraindicated in a patient with a right pneumothorax f

22. Recognised advantages of controlled ventilation in the treatment of flail chest include

- A. reduction of paradoxical ventilation T
- B. the ability to use positive end-expiratory pressure (PEEP) T
- C. decreased pain T
- D. prevention of pneumothorax f
- E. accelerated healing of rib fractures f

23. Appropriate treatment of moderate postoperative hypoxaemia following coronary artery bypass grafting in a ventilated patient with normal cardiovascular parameters includes

- A. digitalisation f
- B. addition of positive end-expiratory pressure (PEEP) T
- C. dopamine infusion f
- D. sodium nitroprusside infusion f
- E. increasing the FiO₂ T

10. **Impairment of left ventricular function resulting from ischaemia during general anaesthesia**
- A. occurs prior to ST segment depression *F*
 - B. fully recovers when ST segment depression returns to normal *F*
 - C. is best recognised by monitoring the pulmonary capillary wedge pressure *F*
 - D. involves a decrease in left ventricular compliance *F*
 - E. can occur in a normal heart *T*
11. **True statements about endotracheal intubation include**
- A. severe laryngeal lesions can be caused by endotracheal tubes *T*
 - B. pneumomediastinum can occur *T*
 - C. diffusion of nitrous oxide into air-inflated cuffs can double intracuff pressure *T*
 - D. after 48 hours of intubation, endotracheal tubes should be replaced by tracheostomy tubes *F*
 - E. most major cuff-related injuries result from use of inappropriately high cuff-to-tracheal-wall pressures *T*
12. **Compared with the adequately spontaneously breathing patient, neuromuscular paralysis and controlled ventilation in the supine, anaesthetised patient are associated with**
- A. improved overall matching of ventilation to perfusion *F* → basal atelectasis
 - B. increased VD/VT *T*
 - C. decreased anterior diaphragmatic motion *T*
 - D. increased posterior diaphragmatic motion *F*
 - E. improved venous return to the right heart *F*
13. **Possible mechanisms for the bronchodilation, which occurs during halothane anaesthesia, include**
- A. inhibition of release of bronchoactive substances *F*
 - B. stimulation of beta-adrenergic receptors *F*
 - C. inhibition of acetylcholine release within the lung parenchyma *T*
 - D. inhibition of alpha-adrenergic receptors *F*
 - E. stimulation of carotid body chemoreceptors *F*

direct action on airway smooth m.
• Systemic distributed via CRAB
• Central neurogenic reflex.

24. Atropine administration during anaesthesia to a patient with severe mitral stenosis can cause increased

A. myocardial oxygen consumption T
B. left atrial pressure T
C. left ventricular filling pressure f
D. pulmonary capillary wedge pressure T
E. cardiac output f

25. Recognised anaesthetic techniques for septoplasty include the use of

A. a throat pack T
B. sodium nitroprusside induced hypotension f
C. nasal preparation with topical cocaine T
D. a nasogastric tube f
E. anticholinergic premedication T

26. Traction on the medial rectus muscle of the eye produces

A. hypertension f
B. bradycardia T
C. mydriasis f
D. Homer's syndrome T
E. cardiac dysrhythmias T

oculoCardiac Reflex

Afferent → Trigeminal n.

Efferent → Vagus n.

stimulus → Traction on EOM (Medial Rectus) Globe pressure ocular manipulation, ocular pain after enucleation.

Sinus brady
- Irreg. rhythm.
- ecto P.C.s.
- A-V Block
- V. lach.
- asystole

27. Recognised methods of providing pain relief in the early stages of labour include enucleation.

? A. thoracic epidural f
B. intrathecal analgesia f
C. intramuscular pethidine T
D. hypnosis T
E. nitrous oxide in oxygen T

28. During the third trimester of pregnancy there is

A. an increase in alveolar ventilation T
B. a decrease in haematocrit T
C. decreased basal metabolic rate f
D. an increased blood volume T
E. an increase in functional residual capacity f

Deoxygenated blood

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2 arteries
→ umbilical artery
→ pulmonary artery

29. Drugs which should be avoided in the first trimester of pregnancy include

- A. ondansetron T
- B. penicillin f
- C. metoclopramide F
- D. tetracycline T
- E. metronidazole T

30. The umbilical arteries

- A. originate from the fetal internal iliac arteries T
- B. convey venous blood from the fetus T
- C. contain blood at a PO_2 of 5.3 KPa (40mmHg), f
- D. insert into the fetal inferior vena cava F
- E. are unaffected by autoregulation F

Supply deoxygenated blood from fetus to Placenta.
2 umbilical a. & one umbilical vein from internal iliac arteries.

Pressure inside C 50 mmHg

31. Post-laparotomy pain contributes to

- A. polyuria F
- B. nausea T
- C. hypoxaemia T
- D. decreased functional residual capacity (FRC) T
- E. tachycardia T

32. Section of the trigeminal ganglion results in

- A. facial paralysis f
- B. loss of salivary secretion f
- C. ptosis of the eyelid f
- D. vasodilatation of the facial skin f
- E. corneal anaesthesia T

33. Meralgia paraesthetica is relieved by nerve block of the

- A. lingual nerve F
- B. trigeminal nerve F
- C. lateral femoral cutaneous nerve T
- D. lumbar sympathetic nerve F
- E. femoral nerve F

numbness, paresthesia in outer thigh

from injury to lateral cutaneous nerve femoral

34. Side effects of opioid epidural analgesia include

- A. itching T
- B. hypotension F
- C. hypoventilation T
- D. sedation T
- E. urinary retention T

35. Factors influencing the level of a spinal block include the

- A. specific gravity of the anaesthetic solution T
- B. volume of the anaesthetic solution T
- C. dose of local anaesthetic T
- D. age of the patient T
- E. position of the patient T

36. Likely causes of coagulopathy in a patient who becomes septic following colonic resection include:

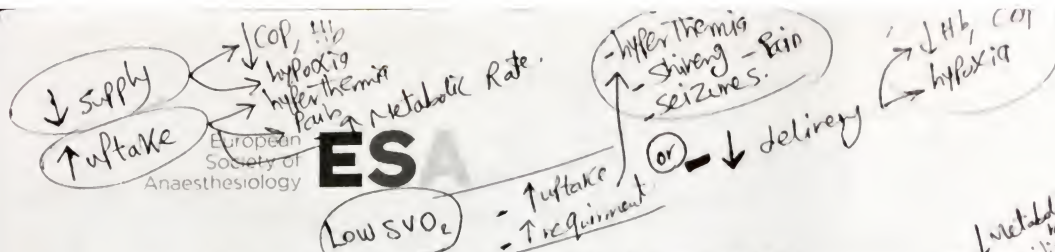
- A. deficiency of vitamin K F
- B. liver damage due to halothane F
- C. disseminated intravascular coagulation T
- D. unsuspected von Willebrand's disease F
- E. administration of low-dose subcutaneous heparin F

37. Reduction in cardiac output associated with high positive end expiratory pressure therapy (PEEP) is secondary to

- A. diminished venous return to the right heart T
- B. diminished left ventricular performance due to shift of the intraventricular septum T
- C. increased right ventricular afterload T
- D. decreased heart rate F
- E. carbon dioxide retention F

38. Positive end expiratory pressure (PEEP) decreases

- A. intrathoracic blood volume T
- B. PaCO_2 F
- C. functional residual capacity F
- D. intracranial pressure F
- E. pulmonary capillary wedge pressure F



39. A decrease in mixed venous oxygen saturation is commonly due to

- A. decreased cardiac output **T**
- B. decreased metabolic rate **F**
- C. increased pulmonary artery pressure **F**
- D. a left to right shunt **F**
- E. decreased arterial oxygen content **T**

40. Possible causes of sudden onset of systolic and diastolic murmurs in a patient with infective endocarditis include

- A. pulmonary embolism **F**
- B. inferior myocardial infarction **F**
- C. prolapsed mitral valve cusp **T**
- D. aortic valve rupture **T**
- E. dissecting aortic aneurysm **F**

41. A high urinary osmolality is associated with

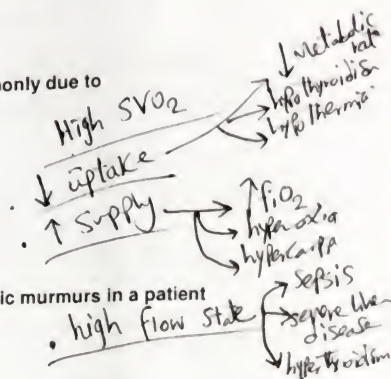
- A. diabetes insipidus **F**
- B. impaired renal function **F**
- C. mannitol administration **T**
- D. diabetic ketoacidosis **T**
- E. dehydration **T**

42. Suitable sedative agents for use in intensive care include infusion of

- A. propofol **T**
- B. midazolam **T**
- C. droperidol **F**
- D. etomidate **F**
- E. clonidine **T**

43. A low arterial PO_2 with a high PCO_2 is associated with

- A. pulmonary oedema **F**
- B. upper airway obstruction **F**
- C. lobar pneumonia **T**
- D. acute salicylate poisoning **F**
- E. exercise at high altitude **F**



* Live site of Synthesis of All Coagulation & Anti Coagulation f.
except → tissue thromboplastin, calcium IV, vWF VIII

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ES

also, site of Clearance of activated F
for warfarin dose, Liver damage, clotting f.

measure
extrinsic
path

Prothrombin time
12-13 sec

measure how long it takes blood to clot

Partial thromboplastin

used to see effect of Heparin

44. In acute hepatic failure
- A. the prothrombin time is normal F
 - B. serum alkaline phosphatase may be normal T
 - C. serum albumin is often below 10gm/L F
 - D. pulse oximetry is inaccurate in the presence of jaundice F
 - E. serum LDH is a sensitive index of hepatocellular damage F

measure
Intrinsic path.

30-50 sec

If ↓ may risk of thrombo embolism
If ↑ → heparin
→ Antiphospholipid Ab
→ hemophilia
→ sepsis.
→ Antibodies against factors

45. The urinary output of creatinine depends upon

- A. protein intake F
- B. urinary volume F
- C. glomerular filtration rate T
- D. catabolism F
- E. the muscle mass of the individual T

46. Probable causes of profound hypotension on commencement of artificial ventilation in a patient suffering multiple trauma include

- A. tension pneumothorax T
- B. hypovolaemia T
- C. cardiac tamponade T
- D. fat embolism F
- E. flail chest F

47. Physical signs characteristic of acute pulmonary embolism include

- A. dyspnoea T
- B. large 'a' wave on the central venous pressure (CVP) curve T
- C. systolic arterial hypertension F
- D. cyanosis T
- E. tachycardia T

48. Decompression sickness

- A. is associated with avascular necrosis of bone T
- B. is due to an alveolar oxygen deficit F
- C. is cured by breathing a mixture of oxygen and helium at atmospheric pressure F
- D. symptoms can occur four hours after the initial drop in pressure T
- E. is avoided if nitrogen is included in the inspired gas mixture F

49. Acute pancreatitis is associated with

- A. retroperitoneal haemorrhage **T**
- B. tetany **T**
- C. pleural effusions **T**
- D. gastric distension **T**
- E. hyperglycaemia **T**

50. Appropriate agents for reversal of acute bronchoconstriction include

- A. salbutamol **T**
- B. ketamine **T**
- C. adrenaline **T**
- D. sodium chromoglycate **F**
- E. atropine **F**

51. Factors correlated with increasing P(A-a)O₂ after surgery in the morbidly obese include

- A. location of incision **T**
- B. type of incision **T**
- C. weight/height ratio **T**
- D. location of excess body fat **T**
- E. intraoperative paralysis and artificial ventilation **T**

52. Findings associated with near drowning in fresh water include

- A. atelectasis **T**
- B. increased lung compliance **F**
- C. loss of pulmonary surfactant **T**
- D. increase in pulmonary venous admixture **T**
- E. haemolysis **T**

53. The "blood-brain barrier" **Brain endothelial cells**

- A. is formed by the arachnoid villi **F**
- B. is less permeable in the newborn **F**
- C. is freely permeable to bicarbonate ions **F**
- D. does not permit free passage of organic anions **T**
- E. has similar functional characteristics to a cell membrane **T**

(BBB)

- highly selective semi-permeable membrane
- Separate circulating blood from brain & extra cellular fluid in CNS
→ allow passively → water
→ some gases
→ lipid soluble molecules
→ occur along all capillaries

54. Neonates with respiratory distress syndrome have

- A. decreased alveolar perfusion T
- B. left-to-right cardiac shunts F
- C. increased work of breathing T
- D. normal alveolar surfactant activity F
- E. a metabolic alkalosis F

55. Concerning the neonatal respiratory system:

- A. the narrowest part of the airway is below the glottis T
- * B. thoraco-pulmonary compliance is higher than in the adult T
- C. the mainstem bronchi leave the trachea at roughly equal angles T
- D. the glottis lies higher in the neck than in the adult T
- E. inspiration is predominantly diaphragmatic T

56. Immediate treatment of an asthmatic child, unsuccessfully treated with epinephrine (adrenaline), who has become hypoxic, drowsy, hypercarbic and acidotic includes

- A. administration of sodium bicarbonate F
- B. intravenous diazepam F
- C. aminophylline infusion F
- D. intubation and ventilation T
- E. nebulised salbutamol F

57. Concerning low platelet counts:

- A. before major surgery they should be increased to at least 50,000/ml T
- B. in the non-surgical patient, counts of 40,000/ml are associated with increased haemorrhage F
- C. platelet concentrate administration is the preferred method of treatment T
- D. fresh frozen plasma should be administered to thrombocytopaenic patients prior to surgery F
- E. they are invariably associated with altered platelet function F

58. Thyroid stimulating hormone (TSH)

- A. increases blood flow to the thyroid gland T
- B. is released from the hypothalamus F
- C. is available as a synthetic product T
- D. is elevated in iodine deficiency T
- E. concentration is used to monitor thyroid hormone replacement therapy T

2 >

59. In pre-renal oliguria

- A. urinary sodium concentration is greater than 75mmol/l
- B. urinary specific gravity is greater than 1015
- C. urine/plasma osmolality ratio is greater than 1.8
- D. urine/plasma urea ratio is greater than 10
- E. urine/plasma creatinine ratio is greater than 30

Actively reabsorbed
in pre-renal state

F → < 20mEq/l

60. Differential diagnoses of an enlarged heart shadow observed on a chest X-ray include

- A. congestive cardiac failure T
- B. pericardial effusion T
- C. mitral valve disease T
- D. hypertrophic subaortic stenosis T
- E. hiatus hernia T

Alveolar Partial Pressure of Oxygen equation

$$PAO_2 = f_{iO_2} \left(\underset{760}{P_{ATM}} - \underset{47}{P_{H_2O}} \right) - \frac{P_a CO_2 \underset{40}{}}{\underset{0.8}{R \text{ (respirator exchange ratio)}}}$$

TFTTF

Partial pressure of water
47 mm Hg

$$PAO_2 = 0.21 (760 - 47) - \frac{40}{0.8} = 99.7$$

at sea level